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1 [A formal framework for modelling and analysing mobile systems](#)



Graeme Smith

January 2004 **Proceedings of the 27th Australasian conference on Computer science - Volume 26 ACSC '04**

Publisher: Australian Computer Society, Inc.

Full text available: pdf(171.04 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper presents a formal framework for modelling and analysing mobile systems. The framework comprises a collection of models of the dominant design paradigms which are readily extended to incorporate details of particular technologies, i.e., programming languages and their run-time support, and applications. The modelling language is Object-Z, an extension of the well-known Z specification language with explicit support for object-oriented concepts. Its support for object orientation makes ...

Keywords: formal methods, mobile computing, object orientation

2 [Verification of the Futurebus+ cache coherence protocol: a case study in model checking](#)



Kylie Williams, Robert Esser

January 2004 **Proceedings of the 27th Australasian conference on Computer science - Volume 26 ACSC '04**

Publisher: Australian Computer Society, Inc.

Full text available: pdf(175.99 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper presents a case study for automatic verification using the Communicating Sequential Processes formalism. The case study concerns the Futurebus+ cache coherency standard; we develop a formal model of the protocol and perform some verification tasks upon it. In the process of doing so, we extend the previous solution by developing a formal specification of cache coherence that is suitable for the verification of both directory and snooping based cache coherence protocols.


3 [A case for test-code generation in model-driven systems](#)



Matthew J. Rutherford, Alexander L. Wolf

September 2003 **Proceedings of the 2nd international conference on Generative programming and component engineering GPCE '03**

Publisher: Springer-Verlag New York, Inc.

Full text available:  [pdf\(283.86 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citings](#), [index terms](#)


A primary goal of generative programming and model-driven development is to raise the level of abstraction at which designers and developers interact with the software systems they are building. During initial development, the benefits of abstraction are clear. However, during testing and maintenance, increased distance from the implementation can be a disadvantage. We view test cases and test harnesses as an essential bridge between the high-level specifications and the implementation. As such, ...

4 An approach for supporting aspect-oriented domain modeling

Jeff Gray, Ted Bapty, Sandeep Neema, Douglas C. Schmidt, Aniruddha Gokhale, Balachandran Natarajan

September 2003 **Proceedings of the 2nd international conference on Generative programming and component engineering GPCE '03**

Publisher: Springer-Verlag New York, Inc.

Full text available:  [pdf\(511.47 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citings](#), [index terms](#)

This paper describes a technique for improving separation of concerns at the level of domain modeling. A contribution of this new approach is the construction of support tools that facilitate the elevation of crosscutting modeling concerns to first-class constructs in a type-system. The key idea is the application of a variant of the OMG Object Constraint Language to models that are stored persistently in XML. With this approach, weavers are generated from domain-specific descriptions to assist ...

5 ANEMIC: automatic interface enabler for model integrated computing

Steve Nordstrom, Shweta Shetty, Kumar Gaurav Chhokra, Jonathan Sprinkle, Brandon Eames, Akos Ledeczi

September 2003 **Proceedings of the 2nd international conference on Generative programming and component engineering GPCE '03**

Publisher: Springer-Verlag New York, Inc.

Full text available:  [pdf\(158.49 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

A domain-specific language provides domain experts with a familiar abstraction for creating computer programs. As more and more domains embrace computers, programmers are tapping into this power by creating their own languages fitting the particular needs of the domain. Graphical domain-specific modeling languages are even more appealing for non-programmers, since the modeling language constructs are automatically transformed into applications through a special compiler called a translator. The ...

6 Traffic: An independent-connection model for traffic matrices



Vijayi Erramill, Mark Crovella, Nina Taft

October 2006 **Proceedings of the 6th ACM SIGCOMM on Internet measurement IMC '06**

Publisher: ACM Press

Full text available:  [pdf\(274.15 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

A common assumption made in traffic matrix (TM) modeling and estimation is independence of a packet's network ingress and egress. We argue that in real IP networks, this assumption should not and does not hold. The fact that most traffic consists of two-way exchanges of packets means that traffic streams flowing in opposite directions at any point in the network are *not* independent. In this paper we propose a model for traffic matrices based on independence of *connections* rather th ...

Keywords: gravity, independent-connection model, modeling, traffic matrix

7 Latency and topology: Measurement based analysis, modeling, and synthesis of the internet delay space ☐

Bo Zhang, T. S. Eugene Ng, Animesh Nandi, Rudolf Riedi, Peter Druschel, Guohui Wang
October 2006 **Proceedings of the 6th ACM SIGCOMM on Internet measurement IMC '06**

Publisher: ACM Press

Full text available:  pdf(1.64 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Understanding the characteristics of the Internet delay space (i.e., the all-pairs set of static round-trip propagation delays among edge networks in the Internet) is important for the design of global-scale distributed systems. For instance, algorithms used in overlay networks are often sensitive to violations of the triangle inequality and to the growth properties within the Internet delay space. Since designers of distributed systems often rely on simulation and emulation to study design alte ...

Keywords: analysis, distributed system, internet delay space, measurement, modeling, simulation, synthesis

8 Scheduling and execution time analysis: Modeling a system controller for timing analysis ☐

Stephan Thesing
October 2006 **Proceedings of the 6th ACM & IEEE International conference on Embedded software EMSOFT '06**

Publisher: ACM Press

Full text available:  pdf(1.85 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Upper bounds on worst-case execution times, which are commonly called WCET, are a prerequisite for validating the temporal correctness of tasks in a real-time system. Due to the execution history sensitive behavior of components like caches, pipelines, buffers and periphery, the static determi-nation of safe upper execution-time bounds is a challenging task.A successful timing analysis approach developed at Saarland University/AbsInt GmbH uses abstract interpretation to derive safe WCET bounds b ...

Keywords: VHDL, WCET, aiT, avionics, peripherals, static analysis, timing analysis, verification, worst-case execution time

9 Modeling and validation: Reusable models for timing and liveness analysis of middleware for distributed real-time and embedded systems ☐

Venkita Subramonian, Christopher Gill, César Sánchez, Henny B. Sipma
October 2006 **Proceedings of the 6th ACM & IEEE International conference on Embedded software EMSOFT '06**

Publisher: ACM Press

Full text available:  pdf(244.27 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Distributed real-time and embedded (DRE) systems have stringent constraints on timeliness and other properties whose assurance is crucial to correct system behavior. Formal tools and techniques play a key role in verifying and validating system properties. However, many DRE systems are built using middleware frameworks that have grown increasingly complex to address the diverse requirements of a wide range of applications. How to apply formal tools and techniques effectively to these systems, gi ...

Keywords: middleware, timed automata

10 Modeling and validation: Analysis of the zeroconf protocol using UPPAAL



Biniam Gebremichael, Frits Vaandrager, Miaomiao Zhang

October 2006 **Proceedings of the 6th ACM & IEEE International conference on Embedded software EMSOFT '06**

Publisher: ACM Press

Full text available: pdf(229.26 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We report on a case study in which the model checker Uppaal is used to formally model parts of Zeroconf, a protocol for dynamic configuration of IPv4 link-local addresses that has been defined in RFC 3927 of the IETF. Our goal has been to construct a model that (a) is easy to understand by engineers, (b) comes as close as possible to the informal text (for each transition in the model there should be a corresponding piece of text in the RFC), and (c) may serve as a basis for formal verif ...

Keywords: formal methods, model checking, modelling, timed automata, validation, verification, zeroconf protocol

11 Modeling of synchronous systems: A timing model for synchronous language implementations in simulink



Timothy Bourke, Arcot Sowmya

October 2006 **Proceedings of the 6th ACM & IEEE International conference on Embedded software EMSOFT '06**

Publisher: ACM Press

Full text available: pdf(254.73 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We describe a simple scheme for mapping synchronous language models, in the form of Boolean Mealy Machines, into timed automata. The mapping captures certain idealized implementation details that are ignored, or assumed away, by the synchronous paradigm. In this regard, the scheme may be compared with other approaches such as the AASAP semantics. However, our model addresses input latching and reaction triggering differently. Additionally, the focus is not on model-checking but rather on creatin ...

Keywords: simulink, synchronous languages, timed automata

12 Modeling of synchronous systems: Polychronous mode automata



Jean-Pierre Talpin, Christian Brunette, Thierry Gautier, Abdoulaye Gamatié

October 2006 **Proceedings of the 6th ACM & IEEE International conference on Embedded software EMSOFT '06**

Publisher: ACM Press

Full text available: pdf(554.13 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Among related synchronous programming principles, the model of computation of the POLYCHRONY workbench stands out by its capability to give high-level description of systems where each component owns a local activation clock (such as, typically, distributed real-time systems or systems on a chip). In order to bring the modeling capability of POLYCHRONY to the context of a model-driven engineering toolset for embedded system design, we define a diagramic notation composed of mode ...

13 Component-based development and software engineering: Towards a formal foundation for domain specific modeling languages




Ethan K. Jackson, Janos Sztipanovits

October 2006 **Proceedings of the 6th ACM & IEEE International conference on Embedded software EMSOFT '06**

Publisher: ACM Press

Full text available: Additional Information:

 pdf(261.82 KB)[full citation](#), [abstract](#), [references](#), [index terms](#)

Embedded system design is inherently domain specific and typically model driven. As a result, design methodologies like OMG's model driven architecture (MDA) and model integrated computing (MIC) evolved to support domain specific modeling language (DSMLs). The success of the DSML approach has encouraged work on the heterogeneous composition of DSMLs, model transformations between DSMLs, approximations of formal properties within DSMLs, and reuse of DSML semantics. However, in the effort to produce a ...

Keywords: embedded systems, formal logic, horn logic, metamodeling, semantics

14 [Short presentations with posters I: Modeling heterogeneous SoCs with SystemC: a digital/MEMS case study](#) ☐



Ankush Varma, M. Yaqub Afridi, Akin Akturk, Paul Klein, Allen R. Hefner, Bruce Jacob
October 2006 **Proceedings of the 2006 international conference on Compilers, architecture and synthesis for embedded systems CASES '06**

Publisher: ACM Press

Full text available:  pdf(838.53 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Designers of SoCs with non-digital components, such as analog or MEMS devices, can currently use high-level system design languages, such as SystemC, to model only the digital parts of a system. This is a significant limitation, making it difficult to perform key system design tasks -- design space exploration, hardware-software co-design and system verification -- at an early stage. This paper describes lumped analytical models of a class of complex non-digital devices -- MEMS microhotplates -- ...

Keywords: MEMS, SystemC, gas sensor, microhotplate, modeling, power

15 [Modeling and simulation: Automatic performance model construction for the fast software exploration of new hardware designs](#) ☐



John Cavazos, Christophe Dubach, Felix Agakov, Edwin Bonilla, Michael F. P. O'Boyle, Grigori Fursin, Olivier Temam
October 2006 **Proceedings of the 2006 international conference on Compilers, architecture and synthesis for embedded systems CASES '06**

Publisher: ACM Press

Full text available:  pdf(254.09 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Developing an optimizing compiler for a newly proposed architecture is extremely difficult when there is only a simulator of the machine available. Designing such a compiler requires running many experiments in order to understand how different optimizations interact. Given that simulators are orders of magnitude slower than real processors, such experiments are highly restricted. This paper develops a technique to automatically build a performance model for predicting the impact of program tran ...

Keywords: architecture, artificial neural networks, compiler optimization, machine learning, performance modelling

16 [OOPSLA practitioner reports chair's welcome: Using model-driven engineering to complement software product line engineering in developing software defined radio components and applications](#) ☐



Bruce Trask, Dominick Paniscotti, Angel Roman, Vikram Bhanot
October 2006 **Companion to the 21st ACM SIGPLAN conference on Object-oriented programming languages, systems, and applications OOPSLA '06**

Publisher: ACM PressFull text available:  pdf(1.14 MB)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper details the application of Software Product Lines (SPL)¹⁶ and Model-Driven Engineering (MDE)¹⁵ to the software defined radio domain. More specifically it is an experience report emphasizing the synergy¹⁷ resulting from combining MDE and SPL technologies. The software defined radio domain has very unique characteristics as its systems typically are a confluence of a number of typically challenging aspects of software development. To name a few, these s ...

Keywords: development, domain, generation, language, model17 Doctoral symposium chair's welcome: Transformations to automate model change ☐evolution

Yuehua Lin

October 2006 **Companion to the 21st ACM SIGPLAN conference on Object-oriented programming languages, systems, and applications OOPSLA '06****Publisher:** ACM PressFull text available:  pdf(168.87 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

As models are elevated to first-class artifacts within the software development lifecycle, new approaches are needed to address the accidental complexities associated with current modeling practice (e.g., manually evolving the deep hierarchical structures of large system models can be error prone and labor intensive). This research abstract presents a model transformation approach to automate model evolution and testing tools to improve the quality of model transformation.

Keywords: model change evolution, model transformation, testing18 OOPSLA student research competition chair's welcome: Transformations to ☐automate model change evolution

Yuehua Lin

October 2006 **Companion to the 21st ACM SIGPLAN conference on Object-oriented programming languages, systems, and applications OOPSLA '06****Publisher:** ACM PressFull text available:  pdf(168.80 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

As models are elevated to first-class artifacts within the software development lifecycle, new approaches are needed to address the accidental complexities associated with current modeling practice (e.g., manually evolving the deep hierarchical structures of large system models can be error prone and labor intensive). This research abstract presents a model transformation approach to automate model evolution and testing tools to improve the quality of model transformation.

Keywords: model change evolution, model transformation, testing19 OOPSLA demonstrations chair's welcome: DEMOS: a tool for declarative executable ☐modeling of object-based systems

Christian Glodt, Pierre Kelsen

October 2006 **Companion to the 21st ACM SIGPLAN conference on Object-oriented programming languages, systems, and applications OOPSLA '06****Publisher:** ACM PressFull text available:  pdf(84.36 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The recently introduced EP-model citeptr proposes a declarative executable model for engineering object-based systems which achieves executability through a hybrid approach that annotates model elements with Java code snippets. Current modeling tools are not appropriate for this hybrid approach which requires graphical model editing, code generation and tight IDE integration to provide an effective modeling environment. DEMOS citedemostool is an Eclipse-based tool which supports editing and exe ...

Keywords: Java, code generation, coupling, declarative, eclipse, executable models, functional programming, object-oriented programming, visual programming

20 OOPSLA onward! track chair's welcome: Model-based DSL frameworks



Ivan Kurtev, Jean Bézivin, Frédéric Jouault, Patrick Valduriez

October 2006 **Companion to the 21st ACM SIGPLAN conference on Object-oriented programming languages, systems, and applications OOPSLA '06**

Publisher: ACM Press

Full text available: pdf(517.14 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

More than five years ago, the OMG proposed the Model Driven Architecture (MDA™) approach to deal with the separation of platform dependent and independent aspects in information systems. Since then, the initial idea of MDA evolved and Model Driven Engineering (MDE) is being increasingly promoted to handle separation and combination of various kinds of concerns in software or data engineering. MDE is more general than the set of standards and practices recommended by the OMG's MDA proposal. ...

Keywords: DSL engineering, MDA, model-driven engineering, tool-based approaches

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TITLE: Apparatus and method for inputting measurements into a software product to construct software models of architectural structures

PUBLICATION-DATE: April 28, 2005

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY
<u>Lindenbaum, Michael Neil</u>	Denver	CO	US

US-CL-CURRENT: 703/1

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	MMC	Draw De
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Apr 20, 2006

PGPUB-DOCUMENT-NUMBER: 20060084502

PGPUB-FILING-TYPE:

DOCUMENT-IDENTIFIER: US 20060084502 A1

TITLE: Thin client user interface for gaming systems

PUBLICATION-DATE: April 20, 2006

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY
Downs; Justin G. III	Henderson	NV	US
Schubert; Oliver M.	Las Vegas	NV	US
Grauzer; Atilla	Las Vegas	NV	US

US-CL-CURRENT: [463/29](#)

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L4: Entry 2 of 2

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Apr 28, 2005

PGPUB-DOCUMENT-NUMBER: 20050091007

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20050091007 A1

TITLE: Apparatus and method for inputting measurements into a software product to construct software models of architectural structures

PUBLICATION-DATE: April 28, 2005

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY
Lindenbaum, Michael Neil	Denver	CO	US

US-CL-CURRENT: [703/1](#)

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